

CASES OF INTUSSUSCEPTION IN CHILDREN TREATED BY LAPAROTOMY.¹

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THE eighteen cases of intussusception in children on which this paper is founded are all which have come under my care at either the Evelina Hospital for Sick Children (thirteen) or at Guy's Hospital (five).

I have not operated on any case as one of intussusception which has not proved to be intussusception, nor have I met with a case in which an intussusception has been overlooked.

So many writers of repute have for the past seven years urged the advantage of laparotomy over other methods of reduction, that its advisability must now be agreed upon; but well-recognized lines of treatment, especially if simple and non-operative, die hard, and so inflation will only be finally given up after many more successful laparotomies have been recorded.

Etiology.—Of the cases under one year, fourteen in all, ten were stated to have been entirely breast-fed, and all the babies were decidedly above the average of hospital patients in size and degree of nourishment.

Presence of a Tumor.—In sixteen of the eighteen cases a tumor was felt either through the abdominal wall or per rectum, and several times the value of bimanual examination, as suggested by Mr. Eve (*Clinical Journal*, 1899), was demonstrated; in fifteen of these sixteen cases diagnosis was easy and treatment was prompt. In one case (No. 16), on the history of some weeks' abdominal pain with occasional attacks of vomiting, a diagnosis of tuberculous peritonitis was made, the tumor being regarded as matted omentum and in-

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testines, and in consequence of this, operative interference was undertaken too late; this was probably a chronic intussusception, in which the acute exacerbations were caused by an increase of the invagination.

Both the cases in which no tumor was found ended fatally; in one (No. 4) the symptoms were not typical, and operation was delayed for twenty-four hours after her admission. Her symptoms before death were most peculiar, and were suggestive of some cerebral lesion rather than of any result of the intussusception; unfortunately, no post-mortem could be obtained. In the other case (No. 11), the abdominal distention and the position of the intussusception, which was enteric, no doubt were responsible for the failure to detect a tumor.

Yet, while a tumor was so frequently present, my cases well emphasize the variability of its position and the value of an examination under an anæsthetic in locating it. In fact, the observance of routine examination under an anæsthetic has several times led to the detection of a tumor in a case which might otherwise have been regarded as one of enteritis; unfortunately, in Case No. 4 this precaution was neglected.

Duration before Operation.—All writers agree that there is no exact relation between duration and ease of reducibility; but of those in which the time is given, all of less than forty-eight hours' duration were reducible, though with varying ease, which strikingly bears out Gibson's (*ANNALS OF SURGERY*, 1900) contention that after the second day the ease of reducibility markedly diminishes; for he reckons that on the first day 94 per cent., on the second day 83 per cent., and on the third day 61 per cent., are reducible.

Variety of Intussusception.—After Mr. Corner's exhaustive paper (*ANNALS OF SURGERY*, 1903), and as Mr. Wallace has fully dealt with this part of the subject in his paper, I do not propose to say much about the varieties of intussusception met with. It seems now probable that single ileo-cæcal intussusceptions are not as common as earlier writers—Sargent (*St. Thomas's Hospital Reports*, 1900) and Eccles

(*St. Bartholomew's Hospital Reports*)—considered; yet, though I have since my first operation carefully looked for double intussusceptions, ten, at least, of my eighteen cases were of the single ileocæcal type. The eleventh single intussusception was enteric (No. 11), and was of interest in that the ileum at the apex of the intussusception was so much narrowed as to suggest the possibility of a congenital stricture at that spot having given rise to the intussusception. A second point worth mention in this case was a persistent Meckel's diverticulum: this was some distance above the intussusception and clearly had never been involved.

I can only record seven double intussusceptions: colic ileocæcal, 3; ileocolic-colic, 2; enteric-ileocæcal, 2.

My early acquaintance in April, 1900 (Case No. 2), with the cæcal variety of Mr. Eve (*Clinical Journal*, 1899), described by Mr. Corner as colic ileocæcal, led me to look for this form again, but only two other examples (Nos. 14 and 17) were met with, making 16.6 per cent. of the eighteen cases.

In Case No. 7 there was possibly a triple intussusception, for the ileum was prolapsed into or through the ileocæcal valve, and there was a well-marked and apparently independent invagination of the caput coli some distance to the right of the valve, so that this may be colic ileocolic-colic, and not ileocolic-colic, as I have regarded it in my list.

I do not attach great value to a minute division of intussusceptions into many varieties, and at an operation completed as rapidly as possible it is obviously most difficult to distinguish between forms so nearly related as ileocolic-colic and enteric-ileocæcal. (Corner.)

Treatment and Technique.—In seventeen of my cases primary laparotomy was undertaken at the earliest possible moment; in the eighteenth (No. 9), inflation had been twice tried and had failed before I saw the case. Except in cases 11 and 16 my incision was always made on the right side of the middle line, with the centre at or below the level of the umbilicus; in the majority it was through the right semi-lunar line; but recently I have cut vertically over the right

rectus, separating its fibres, thinking that by this means a firmer scar might be obtained.

I have not made use of the combined method of inflation with laparotomy (Kellock), which in my opinion, besides the time necessary for its performance, has the great disadvantage that it increases the intra-abdominal contents, and therefore will militate against the replacement of the already distended intestines within the abdomen. I have found that a second assistant's finger introduced per rectum promptly and gently reduces the intussusception usually as high as the iliac colon, where it can be easily dealt with by the operator from the abdominal cavity.

Until the reduction has reached the ascending colon it is carried out partly out of sight; then the intussusception is delivered from the abdomen, and the remainder of the procedure carefully watched.

Escape of the intestines during the manipulation of the intussusception is, I feel sure, to be avoided whenever possible, and, in fact, often the chief difficulty is experienced and much loss of time is occasioned in returning the escaped bowel within the peritoneal cavity; further, I feel sure that the dragging of the dependent intestines upon the mesenteric plexuses increases shock. When this does happen and the bowel is much distended, I have found it most useful for the assistant to strongly lift up and separate the two edges of the wound with Spencer Wells's forceps, when the bowel can be paid back coil by coil into the abdomen.

Unless the condition of the patient was extreme, the abdominal wall was always united by three layers of sutures, silk in the early cases and catgut recently being used for the buried sutures.

Results.—Six cases (Nos. 3, 10, 11, 15, 16, and 18) died between four and twenty hours after the operation from shock and toxæmia; of these in Nos. 11, 15, 16, and 18 this was clearly due to the resection of the bowel. One (No. 10) was so ill that nothing more than the formation of an artificial anus could be attempted.

As there was no post-mortem in Case 4, I cannot suggest the cause of death on the fourth day; when the abdomen was opened a second time, it was thought that the intestines might not have recovered from the strangulation, but everything was found to be perfectly healthy, and there was no obvious cause for her condition.

I do not propose with my small number of cases to dwell on statistics; my immediate results show a mortality of 39 per cent. (seven deaths in eighteen cases); if we include two other babies (Cases 5 and 6) who were readmitted within a few days of their discharge, and whose death was indirectly a result of the intussusception, the mortality increases to 50 per cent.; both these died twenty-three days after the laparotomy, which could have had no relation to the ultimate result.

I have perhaps been unfortunate in the large proportion of irreducible and gangrenous intussusceptions (five cases) that have come under my notice, for, excluding these, the mortality of two out of thirteen laparotomies works out at 15.4 per cent.

I am sure everybody will agree that no mechanical means alone could reduce an intussusception found to be irreducible or gangrenous at a laparotomy; and yet I know of no statistics embracing a large number of cases treated alone by inflation which give a mortality even as low as 50 per cent.

In the two cases (Nos. 5 and 6) who were readmitted for diarrhœa, it is probable that the intestines, though easily reduced, did not return to their normal condition. In support of this idea, the notes of the post-mortem on No. 5 are most interesting, for here the reduction was peculiarly easy and the intestines at the time of operation apparently only slightly strangulated. It is therefore probable that the same result would have followed reduction by mechanical means, which suggests that intussusception may be followed by remote as well as immediate risks, and that the recovery of the child from his acute illness may be more apparent than real. It would be interesting to know whether the ultimate results in

CASES OF INTUSSUSCEPTION

No.	Name.	Sex.	Age.	Date.	Feeding.	Symptoms.	Position of Tumor.	Time of Operation after Onset.
1	L. C.	F.	3½ months	Apl., 1900	Breast	Sudden onset, crying out and vomiting. Blood passed ten hours after onset. Tumor felt in abdomen.	Right hypochondrium.	21 hours
2	C. W.	F.	3½ months	Apl., 1900	Breast	Sudden onset, screaming, refused food, sick. Blood six hours after onset. Abdomen rigid and distended. Nil on R. E., but tumor felt bimanually under anæsthetic.	Right inguinal region, just above pelvic brim.	45 hours
3	A. E.	M.	5 months.	Dec., 1900	Breast	Sudden onset, screaming. Blood passed five hours after onset, vomiting. Tumor felt, and on R. E. apex of intussusception 1½ inches from anus.	Left iliac region.	33½ hours
4	L. R.	F.	9 years.	Mar., 1900		Vomiting, pain under right rectus; bowels open, no blood. Sent in diagnosed as intussusception. Nothing found even under anæsthetic, very sick.	No tumor.	3 days
5	E. N.	M.	3 months.	July, 1901	Breast	Sudden onset, crying, and soon passed blood and mucus, vomited. Tumor felt. R. E. nil.	Right lumbar region.	15 hours
6	M. G.	F.	6 months.	Sept., 1901	Breast	Sudden onset, vomiting, crying, passed blood and mucus. Tumor felt. R. E. revealed nil, but blood and mucus were on finger; nothing on bimanual examination.	Right lumbar and hypochondriac regions.	29 hours
7	D. H.	M.	8 months.	Jan., 1902	Breast	Strained and passed normal stool, when "prolapse" came down, which doctor reduced, after which blood and mucus were passed and "prolapse" came down again.	Projecting from anus.	30 hours
8	W. M.	M.	6 months.	June, 1902	Not stated	Blood passed, vomiting, and tumor felt.	Not stated.	....
9	J. D.	M.	9 months.	Aug., 1902	Not stated	Sudden onset, vomiting, blood passed, tumor felt.	Umbilical region.	9
10	A. G.	M.	3 months.	Aug., 1902	Breast	Sudden collapse, vomiting, blood and slime passed, tumor felt. On R. E. no tumor felt, but blood on finger.	Left side, mainly in left iliac region.	53
11	R. B.	M.	15 years.	Sept., 1902	....	Pain in abdomen, vomiting, B. O. only once since onset (five days), and then blood was passed. Some distention.	No tumor.	5 days
12	A. D.	M.	11 months.	Dec., 1902	Breast and other food	Sudden onset of vomiting, tumor easily felt. R. E. disclosed apex 1½ inches from anus.	Left side from left hypochondrium to left iliac fossa	9½ hours
13	C. R.	F.	5 months.	Feb., 1904	Breast	Sudden onset, crying, straining, persistent vomiting, passage of blood and slime. No tumor felt until anæsthetic given, when a transverse tumor was found.	Umbilical region.	32½ hours
14	E. C. M.	M.	4½ months	Mar., 1904	Not stated	Crying, passed mucus and blood, tumor felt under anæsthetic.	Not stated.	5½ hours
15	B. M.	M.	3 years.	Apl., 1904	....	.....	.....	....
16	E. B.	F.	9½ years.	Apl., 1904	....	Has been ill for six weeks with abdominal pains and vomiting, was treated at another hospital, and admitted to Evelina three weeks before operation. Mass felt around umbilicus. There was only occasional vomiting until three days before operation, after which it was frequent. Tumor unaltered. Abdominal pain almost constant. Bowels irregular. No blood passed.	Umbilical.	3 weeks 3 days
17	C. E. U.	M.	11 months	June, 1904	Breast	Sudden vomiting, much crying, with pain. Tumor felt. On R. E. nothing found.	Right hypochondrium and epigastrium.	8½ hours
18	E. S.	M.	8 months.	Dec., 1904	Breast	Passage of blood. Severe abdominal pain; no vomiting. Treated three weeks for dysentery.	Not felt in abdomen, easily felt per rectum.	3 weeks

CASES, 18. Males, 12; Females, 6. { Ileocolic, 10; Colic-ileocolic, 3; Enteric-ileocolic, 2; Ileocolic-colic, 7; Enteric, 1.

IN CHILDREN.

Nature.	ure.	Duration of Operation.	Result.	Remarks.	Ultimate Result.
Ileocaecal	2 layers	40 minutes	Discharged	Reduction difficult. Peritoneum torn in several places and sutured with silk. Child was very ill, with vomiting for thirty hours after operation. Reduction very easy. Great difficulty in returning intestines which had escaped.	September 1, 1901. I opened a post-pharyngeal abscess. December, 1904, quite well, scar firm.
Colic-Ileocaecal	1 layer	Not stated	Discharged	Reduction extremely difficult. Peritoneum and muscular coat much torn; sutured. Intestines returned with difficulty. Death twenty hours after operation.	No post-mortem.
Ileocaecal	1 layer	35 minutes	Died	Child was not admitted until two days after onset; and when seen next day I diagnosed "obstruction." Intussusception was found with difficulty; easily reduced. Much improved after operation, but on fourth day became comatose and moaned. I again opened abdomen and found nothing.	No post-mortem.
Ileocaecal	3 layers	Not stated	Died	Reduction easy. Child did well for eight days, when diarrhoea began; this improved, and he was discharged to be fed by mother, but he was brought back next day very ill and died twenty-four days after operation.	Post-mortem.—No peritonitis; cecum, ascending colon, and end of ileum grayish and very friable and much collapsed. Catarrhal enteritis.
Enteric-Ileocaecal	3 layers	18 minutes	Discharged apparently well.	Was not admitted until twenty-four hours after onset. Reduction easy. Last two inches of ileum reduced last.	Readmitted next day with diarrhoea and vomiting, and died eleven days later. No post-mortem.
Ileocaecal—colic	3 layers	22 minutes	Discharged	Reduction very easy, after all the part in rectum had been reduced by a finger within rectum.	December, 1904, quite well, scar firm.
Ileocaecal—colic	....	.....	Discharged	Report missing. Notes from observers.	Readmitted in September, 1902, and died of bronchopneumonia; caecal region normal.
Ileocaecal	3 layers	15 minutes	Discharged	Two attempts at inflation with milk failed to cause disappearance of tumor. Reduction easy.	
Unreduced; at P. M. found to be Enteric	Not sewn up	Under 20 minutes	Died	Intussusception could not be reduced, so a Paul's tube was tied into ileum and the intussusception left outside.	Died five hours later. At the post-mortem Dr. French could not reduce the intussusception.
Enteric	3 layers	45 minutes	Died	Peritonitis. Resection of eighteen inches of small intestine, which was gangrenous and perforated, end-to-end anastomosis with simple suture. Meckel's diverticulum present, not involved.	Death four hours after operation. Resection six inches from ileocaecal valve.
Ileocaecal	3 layers	35 minutes	Discharged	Reduction difficult and prolonged.	December, 1904, is delicate.
Colic-Ileocaecal	3 layers	17 minutes	Discharged	Reduction easy. Well-marked caecal dimple.	December, 1904, seems well, but still passes blood. Scar firm.
Ileocaecal	3 layers	Under 30 minutes	Discharged	Reduction easy; suture of abdominal wall took a long time because of tendency of bowels to prolapse.	
Enteric-Ileocaecal	3 layers	About 45 minutes	Died	Irreducible. Enteric intussusception resected and gut united by end-to-end anastomosis with simple suture.	Died six hours later. Post-mortem, early peritonitis.
Ileocolic—colic	3 layers	Under 60 minutes	Died	The case was regarded as tuberculous peritonitis; when I saw her just before operating, she had pulse 160, abdominal faces, was very restless, constantly sick, abdomen extremely tender and rigid; indicating "obstruction." The intussusception extended into descending colon, and the part in the ascending colon could not be reduced, so it was resected and end-to-end anastomosis done.	Died five and a half hours after operation. Post-mortem, no peritonitis.
Colic-Ileocaecal	3 layers	20 minutes	Discharged	Reduction easy. Rapid recovery, but on thirteenth day wound burst and small intestine and omentum prolapsed. Under anæsthetic, gut returned and wound resutured in one layer.	Was readmitted with whooping-cough, of which he died, September, 1904.
Ileocaecal	3 layers	45 minutes	Died	Abdomen very much distended and contained turbid fluid; last three inches could not be reduced and ensheathing layer torn, so this was opened and tumor exposed and removed. The gut was joined by Maunsell's end-to-end anastomosis.	He died five hours later. Post-mortem, early peritonitis.

Died, 7. Mortality, 39 per cent.; or, excluding irreducible cases, 15.4 per cent.

Under one year of age: Mortality, 21.4 per cent.; excluding irreducible cases, mortality, 8.3 per cent.

a large number of cases treated by different methods confirm this suspicion of vulnerability in children who have recently suffered from intussusception.

May I venture to suggest for discussion the treatment of irreducible intussusception?

Here I think we must separate simple irreducible cases from those which, besides being irreducible, are also gangrenous. Thinking over my five irreducible cases (Nos. 10, 11, 15, 16, and 18), I am in agreement with Gibson (ANNALS OF SURGERY, 1900) in decidedly preferring resection in gangrenous cases to the formation of an artificial anus, for, as Gibson points out, the latter does not remove the infective intestine.

In non-septic irreducible cases, either an artificial anus or a longitudinal division of the ensheathing and returning layers may be undertaken, and I intend in my next case to adopt the latter course, following it, if necessary, by a modified resection.

In the four cases with gangrenous bowel resection was carried out in three (Nos. 11, 15, and 16) by enterectomy between Lane's clamps and end-to-end union by simple suture in two layers, the inner passing through all the coats and the outer through the peritoneal and muscular coats only. In the eighteenth case the apex of the intussusception was exposed by incision through the ensheathing layer and cut off, the cut ends of the intestine being united by Maunsell's method.

Gibson (*loc. cit.*) quotes sixty-one cases of irreducible or gangrenous intussusceptions of which forty-nine died, and the fact that there was only one resection for a gangrenous intussusception among the twelve recoveries is a strong argument for inquiry as to the best line of treatment in these cases.